WHAT IS CLAIMED IS:

1. A method of manufacturing a semiconductor device comprising steps of:

forming a first metal film having a reducing property on a semiconductor substrate;

thermal treating the resulting semiconductor substrate for reducing a native oxide film naturally formed on the semiconductor substrate and for forming a first silicide film on the semiconductor substrate;

removing an unreacted first metal film selectively;

forming a second metal film on the semiconductor substrate; and

thermal treating the resulting semiconductor substrate for forming a second silicide film on a surface of the semiconductor substrate which includes a region where the first silicide film is formed.

2. A method of manufacturing a semiconductor device according to claim 1, wherein the first metal film is a titanium film.

3. A method of manufacturing a semiconductor device according to claim 1, wherein the second metal film is a cobalt film.

4. A method of manufacturing a semiconductor device according to claim 2, wherein a thermal treatment is carried out at a temperature of 500°C or less.

5. A method of manufacturing a semiconductor device according to claim 4, wherein the first silicide film is formed to have a

thickness of 1 to 10 nm.

6. A method of manufacturing a semiconductor device according to claim 1, wherein the second metal film is formed to have a thickness of 1 to 10 nm.

7. A method of manufacturing a semiconductor device according to claim 1, further comprising a step of forming a protection film after the step of forming the second metal film and before the step of thermal treating for forming a second silicide film.

8. A method of manufacturing a semiconductor device according to claim 7, wherein the protection film is a titanium nitride film.

9. A method of manufacturing a semiconductor device according to claim 1, further comprising a step of oxidizing the semiconductor substrate in a mixed solution of hydrochloric acid, hydrogen peroxide solution and water before the step of forming the first metal film.

10. A method of manufacturing a semiconductor device according to claim 1, wherein the substrate is heated when the first metal film is formed and this heating of the substrate also serves as the thermal treatment for reducing the natural oxide film and forming the first silicide film.

11. A method of manufacturing a semiconductor device according to claim 1, which is adapted for forming a MOSFET, CMOSFET or MIS transistor.

12. A semiconductor device manufactured by a method

comprising steps of:

forming a first metal film having a reducing property on a semiconductor substrate;

thermal treating the resulting semiconductor substrate for reducing a native oxide film naturally formed on the semiconductor substrate and for forming a first silicide film on the semiconductor substrate;

removing an unreacted first metal film selectively;

forming a second metal film on the semiconductor substrate; and

thermal treating the resulting semiconductor substrate for forming a second silicide film on a surface of the semiconductor substrate which includes a region where the first silicide film is formed.